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Student Perceptions of Exodontia Competency Assessment in a UK Dental School

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Keywords

Exodontia; extraction; competence; undergraduate; oral surgery

Abstract

Modern medical and dental training has migrated from assessing only the quantity of procedures performed to a combined assessment of both competency and quantity. This study explores student perceptions of competency assessment in exodontia at a UK Dental School.

Materials and Methods: Anonymous questionnaires were distributed to dental students in year's three, four and five at the School of Dentistry, Cardiff University (n=149). Responses consisted of dichotomous tick boxes and 5-point Likert scales, with thematic analysis of free-text responses. Discrete variables were analysed using simple descriptive statistics. Recurring themes were identified from the responses.

Results: 129 questionnaires were returned (response rate 87%). Feedback from students indicated that they felt well prepared to undertake the competency assessment, agreeing that year three is the most appropriate year to assess competency (69%; n=86). In 50% of cases (n=65) the clinical supervisor was not present for the duration of the

assessment. The undergraduate student body would like further teaching in the use of elevators (89%; $n=114$).

Conclusion: The competency assessment was deemed fit for purpose by the undergraduate student body. Further developments in the areas of clinical supervision and teaching on the use of elevators were considered and recommendations made to the School of Dentistry, Cardiff University. The current oral surgery course incorporates some of the recommendations.

Introduction

Dental undergraduate training has become increasingly orientated towards competency-based education (1, 2). The General Dental Council (GDC) defines competence as *'A sound theoretical knowledge and understanding of the subject together with an adequate clinical experience to be able to resolve clinical problems encountered, independently, or without assistance'* (3). The GDC and the Association for Dental Education in Europe (ADEE) prescribe learning objectives that undergraduate students are required to satisfy, including the demonstration of competence within certain key fields (4-7). The fulfilment of competence cannot be achieved immediately; instead it is accomplished in phases; novice, beginner, competent and forms part of a continuum where responsibility is transferred from the teacher to the learner (8-11). Clinical competence encompasses attributes such as clinical skill, professional values, knowledge and understanding (1, 11-15).

Oral surgery is one clinical area where students are expected to demonstrate competence, including the extraction of erupted teeth and roots in the permanent and deciduous dentition (3). One of the significant challenges faced by dental undergraduate educators is the development of appropriate assessment systems for competence (16). It is widely acknowledged that written examinations alone are insufficient and assessments of competence in situations that closely relate to clinical practice are essential (17).

There is currently no consensus regarding the ideal delivery and assessment of undergraduate teaching in exodontia (18, 19) and hence there are many variations among UK dental schools. The majority of UK dental schools utilise a lecture programme to deliver oral surgery teaching, with some integrating small group tutorials (4). Timings of these didactic teaching sessions differ between schools from years two

and three. The mean number of oral surgery clinical sessions available for students in year three was 16. Teaching in forceps exodontia begins in year three in all schools. Two schools assessed student extraction technique in year two using a phantom head, prior to progression onto patients, which has been recommended by some authors (20). Only a small proportion of schools utilised pre-patient competency assessment in forceps exodontia with a scoring system to provide formative feedback on performance following clinical sessions (7). The mean 'target number' of extractions expected to be completed in 11 of the UK dental schools was 51, with the majority of this quota being achieved in years three and four (4). Structural Clinical Operative Tests (SCOT's) have been implemented in some dental schools, however, many students did not find these beneficial (13).

The mean staff:student ratio was 1:5 across 13 UK dental schools, with the level of supervisor experience ranging from senior house officers to senior lecturers, readers and professors (4). Forty-four percent of students were uncomfortable with being supervised by staff with only one year's postgraduate experience (21). When questioned, 99% of 632 final year UK dental students felt confident extracting a single rooted maxillary tooth with an intact crown. Ninety-four percent also expressed confidence in their ability to remove retained roots of a maxillary molar using either elevators or forceps (22).

The undergraduate oral surgery programme at Cardiff Dental School commences in year three. Initial teaching comprises a two-day introductory symposium that provides students with didactic tuition on forceps exodontia and incorporates a DVD tutorial detailing the identification, application and use of elevators in simple exodontia. Students are given the opportunity to practice extractions on a phantom head model. Further teaching in oral surgery forms part of the oral diseases syllabus in years three and four. The competency assessment in exodontia is mandatory for students in year three and is currently undertaken by one of 15 designated members of staff (of grades ranging from Staff Grade, Specialist Registrar to Consultants). Satisfactory completion is essential for progression into year four of the BDS programme. This assessment utilises a proforma consisting of 10 domains with major and minor error categories (Appendix 1). A major error will result in failure in the assessment. More than 4 minor errors also result in failure. Space is available to encourage written feedback from supervising staff. Students may attempt the competency as many times as required until passed.

Project Aim

This project set out to explore student perceptions of competency assessment in exodontia at the School of Dentistry, Cardiff University.

Materials and Methods

An anonymous semi-structured questionnaire was developed to survey student perceptions of exodontia competency assessment undertaken during the third year of the BDS programme at the School of Dentistry, Cardiff University (Appendix 2). The questionnaire was designed using a blueprint from previous studies on student perceptions of competency assessment (13, 22) and included dichotomous tick boxes and 5-point Likert scales with thematic analysis of free-text responses.

The sampling frame consisted of all year three ($n=76$), four ($n=71$) and five ($n=61$) undergraduate students studying dentistry in 2012 ($n=208$). The questionnaires were distributed to the respective year groups during timetabled teaching sessions. Completed surveys were returned to a designated submission area to ensure anonymity. Only students who had undertaken the competency assessment were eligible to participate ($n=149$).

Simple descriptive analyses were performed using SPSS version 20. Thematic analyses were performed for open-ended questions. Written responses were transcribed into a separate data collection sheet (Microsoft Excel 2010). Recurring themes were identified.

Results

A total of 129 questionnaires were returned (87%). Respondents comprised 12, 56 and 61 students in years three, four and five respectively. Forty-three percent were male and 57% were female and this was representative of the undergraduate student body. The mean number of teeth extracted prior to students undertaking the competency was 11.27 (range 5-25, SD 4.578) with 98% of students ($n=125$) passing the

competency at the first attempt. Of the 2% who did not pass first time ($n=3$), all were female and passed their competency on the second attempt.

Sixty-nine percent of students surveyed ($n=86$) felt that the competency assessment in exodontia should be conducted in year three, while 29% ($n=36$) preferred year four and 2% ($n=3$) year 5 (Fig. 1). Exactly 50% of the respondents ($n=64$) felt that they were well prepared or very well prepared prior to sitting their competency and 14% ($n=8$) felt underprepared or not at all prepared. Thirty-six percent of the students ($n=46$) were neutral. Fifty-nine percent of students ($n=61$) **agreed or strongly agreed they** would benefit from sitting a mock assessment prior to undertaking their competency assessment (Fig. 2). Forty-eight percent of the respondents ($n=56$) stated that when they undertook their competency assessment there were limited clinical sessions remaining in which to complete the exercise. Twenty-seven percent of students stated that they were confident in their ability to pass when they sat for the competency test ($n=32$; 35% ($n=18$) males and 21% ($n=14$) females). Of those students who sat their competency following a supervisor's recommendation, 65% were female ($n=11$) and 35% were male ($n=6$). Very few students ($n=11$) believed that the main reason for the timing of their competency was as a consequence of having found a suitable case (Fig. 3).

Forty-seven percent ($n=61$) of respondents agreed or strongly agreed that completing the competency had improved their confidence in oral surgery. Analysis by gender revealed 48% ($n=35$) of females and 43% ($n=24$) of males believed that their confidence did not improve following the competency test. When questioned on the efficacy of repeating the competency test at a later time period within their undergraduate course, 62% of students ($n=80$) did not perceive any associated benefits. **This represents the opinion of 50% ($n=6$) of year three, 55% ($n=31$) of year four and 70% ($n=43$) of year five students.** Of the 39 students who designated a desired period in which to repeat the competency test, 51% ($n=20$) recommended year four while 38% ($n=15$) suggested repeating the competency in both years four and five. The remaining 11% ($n=4$) stated year five only. In 50% of the competency assessments ($n=65$) the supervising member of staff vacated the surgical unit at least once prior to completion of the extraction. Eighty-five percent of students ($n=109$) reported having had access to the marking criteria used by staff. Eighty-three percent of students ($n=107$) either agreed or strongly agreed that the examiner provided them with

constructive feedback upon completion of their competency assessment while 17% percent of the total respondents ($n=20$), disagreed.

Eighty-nine percent of the respondents ($n=114$) perceived a need for additional teaching in the use of elevators. This was the only category in which the number of students who sought further teaching outweighed the number of students who did not think additional teaching was needed. The use of forceps was the second most popular area where students felt that they required further teaching ($n=45$; 35%). Additional teaching in local anaesthesia was requested by 25% of year three ($n=3$), 18% of year four ($n=10$) and 30% of year five ($n=18$) students. Less than 10% of the total number of students surveyed highlighted: delivering post-operative instructions, patient communication and aseptic technique as clinical domains requiring additional teaching. Twelve percent of the total number of students selected other ($n=11$). Responses to this option included: patient positioning, pre-operative instructions and warnings regarding potential complications, local anatomy, contingency and problem solving should a tooth crown fracture during removal, patient medical history including bisphosphonates and warfarin. Six percent of the students ($n=8$) did not think that any further teaching was required. Fifty-nine percent of students ($n=72$) did not consider the competency assessment to require any improvements.

Thematic analysis identified that the students surveyed would like more supervision during their initial oral surgery clinical training. Students would also prefer individual, predetermined dates on which assessments could be conducted, ensuring that the eligible staff would be available to supervise for the whole session. Of those students who gave suggestions for improvement, 20% expressed their desire to have the competency assessment more standardised, regulating the requirements of the tooth to be used for the competency.

Discussion

Competence-based education uses assessment as a tool for learning. Student perceptions of assessment characteristics, including the authenticity of assessment and feedback, have been shown to enhance student learning (23, 24). This study on student perceptions of exodontia competency assessment showed that dental students were satisfied with the format of the assessment while expressing the need for some changes to improve student experience. Their opinions changed little over the course of the BDS programme between years three and five.

The majority of students felt satisfied with their preparations prior to sitting the exodontia competency. The finding that almost all of the surveyed students passed the competency at their first attempt may have strengthened this feedback. However, **59%** of students agreed that they would benefit from a mock examination prior to undertaking the competency assessment, indicating a perceived advantage to receiving analytical observation which critiques an individual's performance as an aid for learning. Provision of a preclinical extraction course as part of the Oral Surgery Symposium in year three, using mannequin models, was supported by students who demonstrated sufficient levels of competence in forceps exodontia as a consequence. There are limitations to this approach; it has been shown that the utilisation of phantom head models to imitate certain clinical procedures are, in the main, unsuccessful and that didactic teaching and laboratory simulations poorly compensate for inadequate clinical experience (25-27). This may be the case in oral surgery where interpersonal communication and patient management cannot be successfully replicated in the laboratory. There may however be merit in preclinical assessment where students are introduced to the concept of the competency exercise on a number of micro-skills such as patient and operator positioning and the correct selection and application of elevators and forceps.

The perceived lack of relevance for repeating the exodontia competency assessment by year five students reflects a change in attitude established over the course of the BDS programme. This is most likely due to an increase in knowledge and clinical experience over the duration of the course and it would be expected that year five students have improved confidence in exodontia as they progress through the course; retrospectively perceiving additional assessment as not required.

Equivalent proportions of students reported an increase in confidence in oral surgery following completion of the competency as those who stated that they did not perceive themselves any more confident. This was despite 98% of the students passing the competency at the first attempt. As **the building** of confidence is facilitated by a greater level of clinical exposure (5, 22), the differing perceptions of confidence reported in this study suggest a disparity in levels of students' exposure to patients. **In this survey there were 32 students for whom the main reason for sitting the competency was that they felt clinically confident. Of these students, 70% (n=22) had extracted 10 or more teeth at this point, with 50% (n=16) having extracted 15 or more teeth.** At the School of Dentistry, Cardiff University, patients treated in

student extraction clinics are those who had presented with acute symptoms on the same day as an emergency. Hence, student clinical contact is largely determined by selection of suitable patients requiring tooth extraction and the results highlight the differing levels of student-patient contact through the number of extractions performed by students', prior to undertaking their competency (range 5-25). Outreach placements are a method of increasing patient exposure and subsequent student confidence; however, at Cardiff, student outreach placements do not begin until later stages of clinical training. In addition, they have not been proven efficacious in areas such as forceps exodontia (28).

Students reported that ideal opportunities to take the competency assessment were missed on occasions, as a consequence of not having a suitable member of staff on clinic. This was compounded by the finding that, in half of the competency assessments, the supervising member of staff vacated the surgical unit on at least one occasion prior to assessment completion, possibly because of other service needs. In such circumstances it would have been impossible for the assessor to have observed the entire procedure. This calls to question students' adherence to departmental procedural, safety and cross infection protocols during the competency test. It has previously been demonstrated that there are discrepancies between student reports of what they do on clinic and what they do when they are observed (29). Whilst it may be considered efficacious to propose that senior house officers and dental core trainees are permitted to supervise competency assessments in an attempt to increase the number of available supervisory staff, their limited experience means this may not be suitable **and there is evidence to suggest that students are unhappy being supervised by less experienced staff (21).**

One potential amendment to the assessment system, proposed by students in this study, involved the designation of a specific, predetermined date, selected on an individual student basis, to sit their competency. This is however not feasible as the majority of patients seen by undergraduate students are self-referred for emergency care and the availability of suitable cases for assessment are limited. According to this study, only a small proportion of students identified having found a suitable case as the main reason for the timing of their competency.

It is surprising that 15% of students were not aware of the marking criteria used in the competency assessment. This information is readily available to students as part of their oral surgery handbook. A further copy can also be found on the notice board

in oral surgery. Students should be encouraged to actively study the assessment proforma. This will not only enable them to familiarise with the proforma, but also allow self-evaluation as students can identify parameters in which they feel they require further practical exposure, prior to attempting the competency.

This survey highlights that the majority of the undergraduate population (59%) were satisfied with the exodontia competency assessment in its current format. Other positive themes identified through this survey include the appropriate provision of constructive feedback from staff to students following assessment completion. The formative reporting of an assessor's evaluation to the trainee is a pivotal process in the acquisition of clinical skills sets, however, this it is often poorly conducted (30). If adequately formulated, and provided in an understandable manner, the students can identify deficiencies in their ability. This might have influenced student perceptions regarding areas for further teaching.

The DVD tutorial has helped students academically but not practically, as represented by students' reports of feeling underprepared **in the use** of elevators for the role of exodontia. This suggests that the DVD tool has been ineffective. Clinical teaching, which provides a greater degree of kinaesthetic learning, may prove efficacious. Use of a cyclic process of visual observation, whereby a student observes the correct use of elevators in a clinical situation, as used by a more senior member of staff, followed by the student simulating the elevation technique for themselves is considered advantageous in assisting the assimilation of clinical skills (31). Similarly, a process of active learning, in which students engage in case-based tutorials and are provided with the theoretical basis for a procedure prior to attempting the practical aspect themselves is an effective method of developing surgical motor skills and aiding the retention of knowledge (9).

Suggested improvement revealed students' desire to make the competency assessment more standardised. This involves stipulating the requirements for tooth extraction including the type and physical status of the tooth by arch, thus homogenising the assessment process and allowing comparisons between clinical cases. It has to be acknowledged however, complete standardisation is difficult given that exodontia of teeth incorporates a plethora of variables including levels of patient anxiety, patient cooperation, local anatomical variances and differences in patient's medical status. The competency process is designed to ensure that students possess the holistic knowledge and ability to perform all procedures encountered in a patient-

student interaction. Therefore, it is not explicitly an examination of whether the students can solely extract a tooth.

A number of recommendations were made following this study to improve exodontia teaching and assessment of competency.

1. Students should be provided with the marking criteria used in the exodontia competency assessment and the assessment proforma placed online, entitled 'Competency Forms'.
2. Staff should remain in the surgical unit throughout the entire procedure until assessment completion. Staff availability on the oral surgery clinic should be increased to facilitate this.
3. Implementation of a practical method for teaching the use of elevators to compliment theoretical teaching via DVD tutorial is required. Case-based tutorials, followed by the opportunity to practically demonstrate the ability to use elevators should be considered. Phantom head mannequins or pig's heads should be utilised for this purpose
4. Implementation of a mock assessment for extraction competency may be beneficial. This will enable the assessment of micro-skills using phantom head mannequins.

Following these recommendations a number of changes have already been implemented. The number of staff for student supervision has been increased to eight (from six) speciality doctors/associate specialists. This has allowed the supervisor to remain in the clinical unit throughout the assessment. Additional teaching aids have also been placed onto the student local intranet. Despite student opinion that year three was an appropriate stage to assess competence in exodontia, students now have until the end of year four to complete their competency assessment. This allows students to consolidate their knowledge and practical techniques prior to formal assessment.

Conclusion

The competency assessment in forceps exodontia was deemed fit for purpose by the undergraduate student body. However, further developments were recommended and some implemented and adopted by the School to enhance student surgical experience, especially with regard to clinical supervision and teaching **on** the use of elevators.

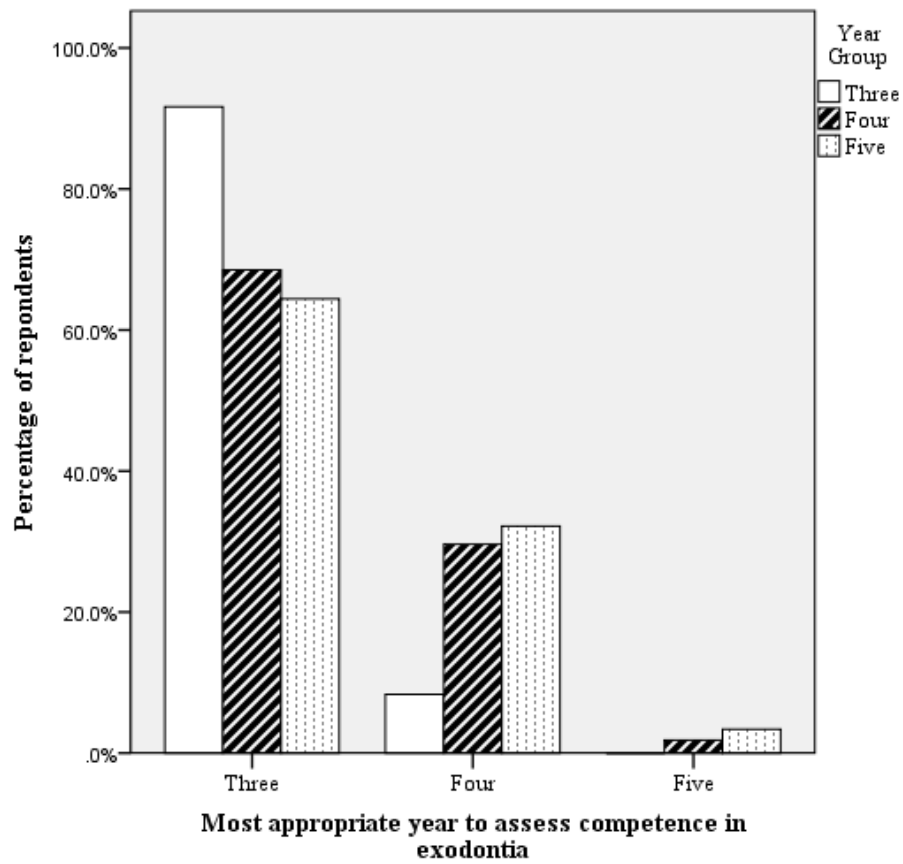


Fig. 1. Student perception: most appropriate year in which to assess competence in exodontia

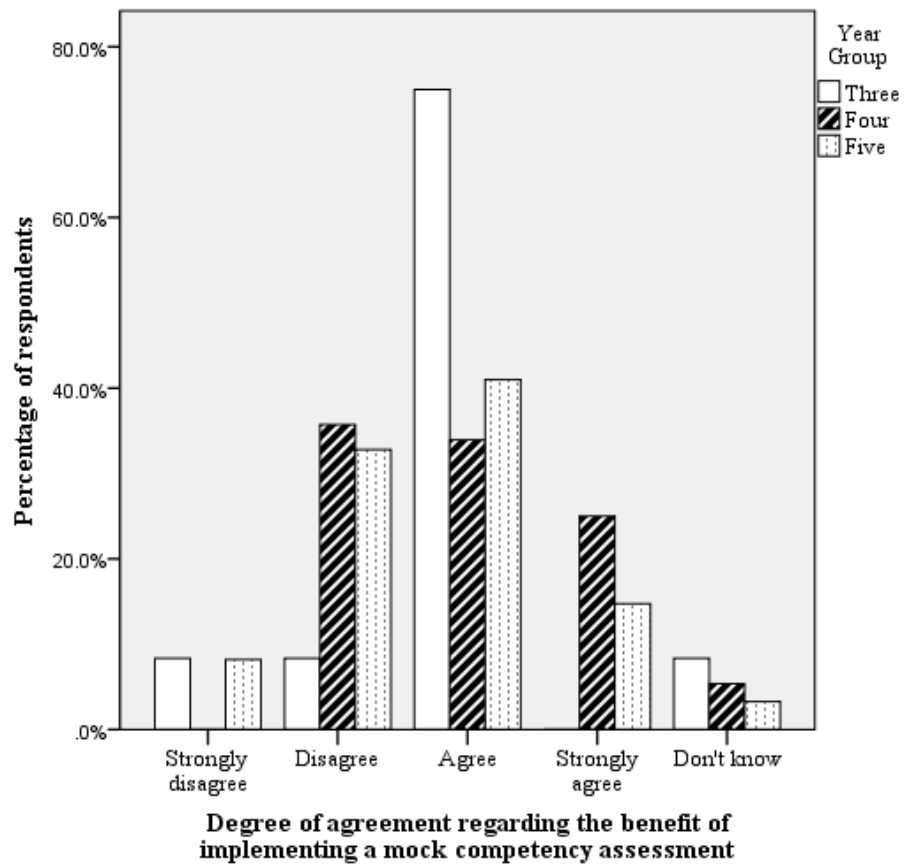


Fig. 2. Student perception: implementing a mock competency assessment

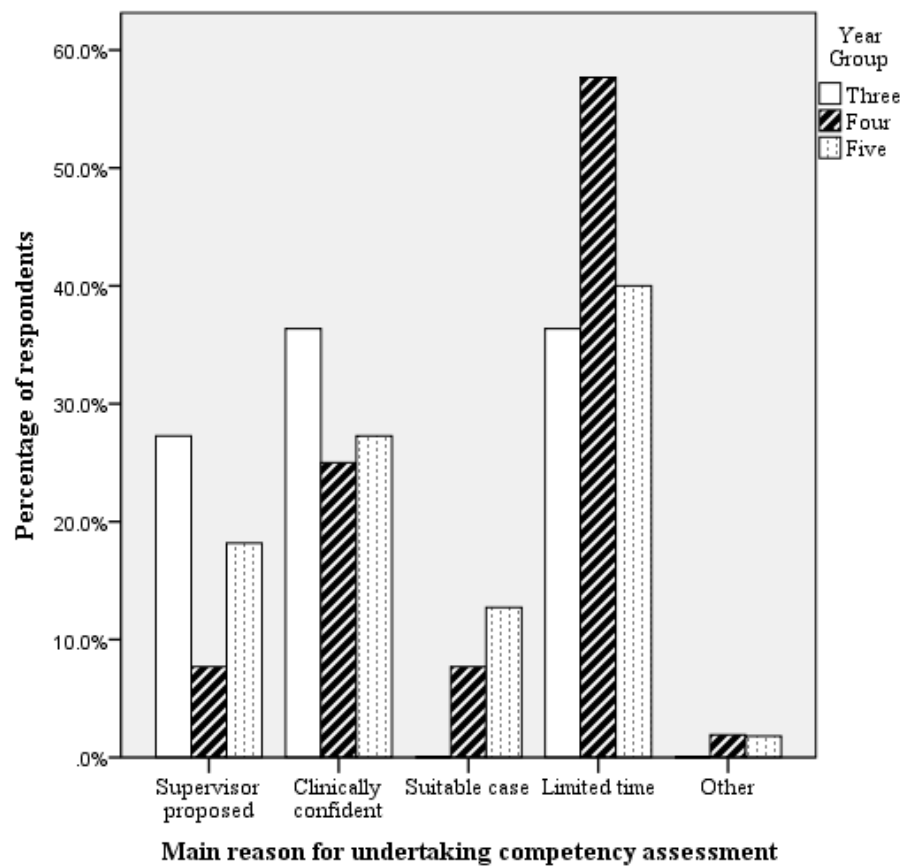


Fig. 3. Reasons for undertaking the competency assessment displayed by year group

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Appendix 1. Extraction Competency Assessment Process and Proforma

Student Name: _____ Student No: _____ Group: ____ Date: _____

Introduction

The extraction competence assessment will take account of both major errors and minor errors. A major error will result in failure in the assessment. More than 4 minor errors will also result in failure.

Major Errors

- 1 Failure to check patient identity.
- 2 *Failure to check medical history and act on significant treatment –
changing medical history.
- 3 *Administration of local anaesthesia at the wrong site(s).
- 4 *Selection of inappropriate instruments.
- 5 Application of forceps or elevators to the wrong tooth.
- 6 Trauma to soft tissues such as the cheek and lip.
- 7 Trauma to adjacent tooth.
- 8 Failure to check haemostasis.
- 9 Inappropriate disposal of sharps.
- 10 Recording wrong tooth in notes.

Minor Errors

- 1 Contravention of aseptic technique.
 - 2 Inadequate eye protection for patient.
 - 3 *Failure to check x-rays and appreciation of relevant anatomy.
 - 4 Inappropriate application of instruments.
 - 5 Needle stick injury.
 - 6 Failure to give postoperative instructions.
- *Determined pre-operatively with assessor.

Assessor comments:

Agreed as a record of events:

Signature of Assessor: _____

Signature of Student:

Student Name: _____ Student No: _____ Group: ____ Date: _____

DATE/PROCEDURE				
Pre-operative Work-up				
Pre-operative Instructions				
Kit preparation				
Scrubbing-up Technique				
Administration of LA				
Extraction of tooth	Forceps			
	Elevators			
Haemostasis				
Disposal of Kit				
Post-operative instructions				
Communication skills overall				

Staff feedback/Signature

1.
.....
2.
.....
3.
.....

Appendix 2. Survey for completion by undergraduate students

1. Gender

☐ Male ☐ Female

2. Which year group are you currently in?

☐ 3 ☐ 4 ☐ 5

3. How many teeth had you extracted prior to undertaking your competency?

(Please provide an approximate figure) _____

4. How many attempts did you require to pass the competency?

5. At what stage in your training do you believe that your competency in exodontia should be assessed?

☐ 3rd year ☐ 4th year ☐ 5th Year

6. On a scale of 1 – 5; how prepared did you feel before sitting your competency?

(1 = not at all prepared, 5 = very well prepared)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

7. I would benefit from having a mock assessment prior to sitting my competency

☐ Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐ Don't know

8. The main reason for the timing of my decision to sit the competency was

☐ Supervisor proposed ☐ I felt clinically confident ☐ Found a suitable case
☐ Time to complete competency was limited
☐ Other (please state) _____

9. Undertaking the competency assessment improved my confidence in oral surgery

☐ Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐ Don't know

10. Would you benefit from having to sit this competency again in order to maintain your clinical skill?

☐ No ☐ Yes (please state when) _____

11. Did the examiner remain in the surgical unit throughout the assessment?

☐ Yes ☐ No

12. Did you have access to the marking criteria prior to undertaking the competency?

☐ Yes ☐ No

13. The examiner provided constructive feedback upon completion of my assessment

☐ Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐ Don't know

14. I would have appreciated further teaching in these areas prior to taking my competency (tick all that apply)

☐ None ☐ Local anaesthesia
☐ Use of elevators ☐ Use of forceps
☐ Delivering post-operative instructions
☐ Patient communication ☐ Aseptic technique
☐ Other (please state) _____

15. Are there any areas in which the competency assessment can be improved?

☐ No ☐ Yes (please state) _____